

the spaced-apart structures moving the patient bed between the imaging position and a displaced position displaced away from the upper and lower poles.

5 22. A method for positioning a patient for MRI using an NMR polarizing magnet having opposed upper and lower horizontal poles defining an MRI image volume within an open gap between the poles that is open on at least three sides, the method comprising:

at a location displaced from the upper and lower horizontal poles, placing said patient on a movable bed having an aperture in an undercarriage disposed below the bed;

10 moving said bed into juxta-position with said open gap; and

continuing to move said bed into said open gap while moving said aperture therebelow over a face of the lower pole with the undercarriage straddling said lower pole of the magnet, thus leaving unobstructed adjacent  
15 access to the patient along an entire patient body side while the patient is disposed in said open gap.

#### REMARKS

This amendment is responsive to the Director's Office Decision mailed February 4, 2000. Re-examination and reconsideration of the application are respectfully requested.

#### The Office Action

**Claims 1-13** stand allowed.

**Claims 14-17** stand rejected under 35 U.S.C. §103(a) as being unpatentable over Matsutani (U.S. Patent

No. 4,875,485) in view of LeVeen (U.S. Patent No. 4,230,129).

**No New Matter Has Been Added by the Amendment to the Specification**

Applicant has amended the Specification to clarify that once the patient is positioned within the gap, the spaced-apart structures **32** are substantially immobilized with respect to the lower magnet pole **1**. By way of example, a locking pin can be passed through the rails or rollers **32** and into the base portion **25**.

In order to achieve high quality NMR images, it is conventional to immobilize the patient supporting structure during imaging. Therefore, although not explicitly stated, the concept of substantially immobilizing the patient bed **33** and the spaced-apart structures with respect to the lower magnet pole **1** was inherent in the application as filed. Consequently, no new matter has been added by the present amendment to the Specification.

**The Claims of the Present Reissue Application Distinguish Over the Cited References**

As a brief review, the present application is directed to an MRI system including an NMR polarizing magnet.

**Claim 14** calls for an MRI system having upper and lower horizontal poles. Matsutani has upper and lower electromagnetic coils **19, 20**. Coil supports **21, 25** and gradient coils **39, 40** are associated with the two coils **19, 20**. The coil support structures **21, 25** permit the Matsutani coils **19, 20** to be easily moved.

**Claim 14** further calls for a movable patient transport having spaced-apart structures depending downward from a horizontal patient bed. This defines an opening under the bed sized to pass the lower magnet pole

therethrough. Matsutani suggests no such patient transport. To the contrary, the coils of Matsutani are readily moved both vertically and rotated about a post **24**. This permits Matsutani to suggest, at column 8, line 62 - column 9, line 4, that when a technician approaches the patient, the magnets should be raised or lowered such that the technician can readily perform the necessary procedures. It appears from the drawings (note FIGURE 1) that the magnets can also be shifted laterally. In FIGURE 9, rather than shifting the coils laterally, it is suggested that the patient support can be shifted laterally and longitudinally. It will be noted that such movement is limited. It will further be noted that the patient support of Matsutani is cantilevered. The patient bed and its single support structure **30** do not straddle a lower pole piece of the magnet. Thus, Matsutani neither provides the patient access nor a movable patient structure as described in **claim 14**.

LeVeen does not cure this shortcoming. LeVeen is directed to an electromagnetic cancer treatment device. Applicators **36, 38** apply electromagnetic energy along a trajectory therebetween. This trajectory is selected such that it passes through a tumor **48**. In order to destroy the tumor and not all tissue along the trajectory, the trajectory is moved such that the tumor is irradiated along the plurality of trajectories. A scintillation camera **70** which monitors radiation which is emitted from radioisotopes that are typically injected into the patient's blood is disposed below the patient. A scintillation camera provides a projection image of the patient's circulatory system. When appropriate radioisotopes are selected, the radioisotope is absorbed strongly by the tumor to be irradiated. The scintillation camera image helps to select and maintain the trajectories

between applicators **36, 38**. The patient bed of LeVeen is adjustable. However, it is submitted this adjustment is for purposes of placing the tumor of a patient disposed on the bed over the scintillation camera. Again, LeVeen has limited movement of the patient bed. It appears that the movement may be so limited that the patient bed is always over the scintillation camera. Thus, LeVeen does not provide a movable transport in the sense of **claim 14**, which moves the patient transport such that an opening thereunder defined by the patient bed and downward supporting structures has moved in such a manner that the scintillation camera **70** passes therethrough.

Neither Matsutani nor LeVeen teaches or fairly suggests a patient transport which has an opening defined by the patient bed and downward depending spaced-apart structures, which patient transport is moved in such a manner that a lower magnet pole passes through such opening. Accordingly, it is submitted that **claim 14** and **claim 15**, dependent therefrom, distinguish patentably and unobviously over the references of record.

**Claim 20** calls for placing a patient on a movable bed having an aperture in an undercarriage disposed below the bed. The bed is then moved into juxtaposition with an open gap of the magnet. The bed is further moved into the gap.

Matsutani does not teach or fairly suggest moving a patient support from a position so displaced from the magnet that it needs to be moved first to go into juxtaposition with poles and moved even further to be moved between the poles. Moreover, Matsutani does not teach or fairly suggest moving the bed in such a manner that its aperture passes over a lower pole face of the magnet for providing unobstructed access to the patient. To the contrary, Matsutani teaches that the magnets should

be moved away from the patient support to provide technician access.

LeVeen fails to cure these shortcomings of Matsutani. The patient support of LeVeen again has limited movement. There is no suggestion of moving the patient bed to the claimed extent. Indeed, in LeVeen there is no need to move the bed such distances. Moreover, LeVeen does not relate to a system for moving a patient into an imaging region of a diagnostic imaging system, particularly a magnetic resonance scanner. Rather, LeVeen relates to a cancer treatment system in which a scintillation camera is disposed permanently on the bed supporting structure above which the bed is mounted to be positionally adjustable. Again, such a range of motion and interrelationship between the patient bed and either a scintillation camera or a lower magnetic resonance pole are not taught or fairly suggested by LeVeen. Accordingly, it is submitted that **claim 16** and **claim 17**, dependent therefrom, distinguish patentably and unobviously over the references of record.

**Claim 18** calls for the magnet to have opposed upper and lower horizontal poles **1** defining a MRI image volume within a gap between the poles. The gap is open about at least three sides (see FIGURE 6). A movable patient transport **31** has spaced-apart structures **32** (e.g., particularly rails or rollers) supporting a horizontal patient bed **33** and depending therefrom, and defining an opening under the bed sized to pass the lower magnet pole **1** therethrough while interjecting the patient bed **33** into the gap. (The rails or rollers **32** inherently define an aperture in the undercarriage; see column 3, lines 38-40 of the present reissue application.) Such a design permits substantially adjacent patient access along a side of the patient while the patient is positioned within the

MRI image volume. (See column 3, lines 36-53 of the present reissue application).

The patient transport has a first position extended away from the NMR polarizing magnet (see column 3, lines 54-59 and FIGURE 3 of the present reissue application). In the first position, the movable patient transport is enabled to allow movement of the bed **33** and the spaced-apart structures **32**. The patient transport has a second position in the gap (see column 3, line 59 to column 4, line 3 of the present reissue application). At the second position, the spaced-apart structures **32** of the transport bed **33** straddle the lower magnet pole **1** (i.e., the spaced-apart structures **32** are set relatively wide apart around the lower pole **1**). Furthermore, the patient transport is constrained to prevent movement with respect to the lower magnet pole **1** during MRI imaging.

The patient bed may be moved in at least two dimensions with respect to the spaced-apart structures. (FIGURE 4 illustrates and column 3, lines 34-41 of the present reissue application describe how the table portion **31** is movable along a first horizontal axis. FIGURE 4 illustrates and column 3, lines 42-53 of the present reissue application describe how the patient platter **33** is capable of translational movement in two directions, as illustrated by arrows A and B in FIGURE 3 of the present reissue application.)

Matsutani discloses an MR system having a cantilevered patient bed with an opening under a support of the patient bed allowing the bed to be positioned over a lower pole of the MR system. Although the bed or patient transport table of Matsutani can be moved, Matsutani is not concerned with extending the bed or patient transport away from the NMR polarizing magnet to a first position. Furthermore, Matsutani is not concerned

with the movable patient transport being enabled to allow movement of the bed and the spaced-apart structures at the first position, as called for in independent **claim 14**. To the contrary, Matsutani suggests moving the magnets (col. 8, line 64 - col. 9, line 4). Also, Matsutani fails to disclose spaced-apart structures supporting a horizontal patient bed and depending therefrom, and defining an opening under the bed sized to pass the lower magnet pole therethrough while interjecting the patient bed into the gap, as called for in **claim 18**.

LeVeen discloses an imaging and therapy system in which a table having two supporting structures and an opening defined under the table are positioned above a scintillation camera **70**. Electromagnetic energy from applicators **36, 38** thermally kill tumors with electromagnetic energy. The applicators are moved to pass the electromagnetic energy through the tumor along different trajectories. The scintillation camera helps align the trajectories with the tumor. Although the bed or patient transport table of LeVeen can be adjustably positioned, LeVeen is not concerned with extending the bed or patient transport away from an NMR polarizing magnet to a first position. In LeVeen, the patient has easy access to the bed or table without moving it. There is no suggestion of moving the bed to a remote location for loading. Furthermore, LeVeen is not concerned with the movable patient transport being enabled to allow movement of the bed and the spaced-apart structures at the first position as called for in independent **claim 18**.

As discussed above, neither Matsutani nor LeVeen discloses, or is concerned with, extending the bed or patient transport away from the NMR polarizing magnet to a first position. Furthermore, neither Matsutani nor LeVeen is concerned with a movable patient transport being

enabled to allow movement of the bed and the supporting structures at the first position, as called for in independent **claim 18**. Therefore, **claim 18** is patentable over the combination of Matsutani and LeVeen.

Dependent **claim 19**, which merely further patentably defines the detailed subject matter of its parent claim, is also believed to patentably define over the applied references, as well as the remaining cited art, in any combination.

Independent **claim 20** calls for a method for positioning a patient for MRI using an NMR polarizing magnet with a C-shaped cross-section. A patient is placed on a movable bed having an aperture in an undercarriage disposed below the bed while the bed is positioned away from the NMR polarizing magnet. The bed and undercarriage are moved above a floor towards the NMR polarizing magnet and into juxta-position with an open gap of the C-shaped magnet.

As discussed above, although the bed or patient transport tables of Matsutani and LeVeen can be moved, neither Matsutani nor LeVeen is concerned with placing a patient on a movable bed having an aperture in an undercarriage disposed below the bed while the bed is positioned away from the NMR polarizing magnet. Furthermore, neither Matsutani nor LeVeen is concerned with moving the bed and undercarriage above a floor towards the NMR polarizing magnet and into juxta-position with an open gap of the C-shaped magnet, as called for in independent **claim 16**. Therefore, **claim 16** is patentable over the combination of Matsutani and LeVeen.

Dependent **claim 17**, which merely further patentably defines the detailed subject matter of its parent claim, is also believed to patentably define over

the applied references, as well as the remaining cited art, in any combination.

New **claims 21** and **22** parallel **claims 14** and **16**. However, these claims have been amended to emphasize the extent of motion of patient support and the manner in which the patient support straddles the lower pole. Again neither Matsutani nor LeVeen teaches or fairly suggests a patient support that straddles a lower pole of a magnetic resonance imaging system. Nor do the patient support systems of Matsutani or LeVeen move the patient over the claimed range of motion. Accordingly, it is submitted that new **claims 21** and **22** also distinguish patentably over Matsutani and LeVeen.

**Interference with Li et al.**

New **claims 18, 19, and 20** are based on amended **claims 2, 4, and 10** of the Li et al. ("Li") re-examination application, Serial No. 90/005,017.

**Claims 14-17** are broader than the claims in the Li re-examination application and were given up by Li during such re-examination.

New **claims 21** and **22** are of a scope between original **claims 14-17** and new **claims 18-20** and, therefore, are not broader than new **claims 18-20**.

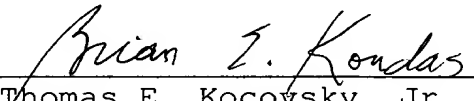
It is again requested that an interference be declared between the present application and the Li re-examination application based on **claims 18-20** herein.

**CONCLUSION**

For the reason set forth above, it is requested that **claims 1-22** be allowed and that an interference with Li be declared based on **claims 18-20**.

Respectfully submitted,

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